

CLAIMS:

1. A method of operating a speech dialogue system (1) which communicates with a user while use is made of a speech recognition device (2) and a speech output device (3), various services (9, 10) being available to the user in the speech dialogue system (1) or via the speech dialogue system (1) and being selectable by the user in a dialogue held with the speech dialogue system (1), and then for controlling the dialogue for the selection of a service (9, 10) by the user, a database (6) is used having a hierarchical data structure (DS) and a plurality of nodes (K) and a plurality of paths (P) for connecting the nodes (K) mutually and for connecting nodes (K) to service objects (D) which are arranged at one end of each path (P) in the data structure (DS), the service objects (D) representing the services that are available (9, 10) and the nodes (K) representing the categories in which again other categories and/or services are classified which are represented by further nodes (K) or service objects (D) arranged in the hierarchical data structure (DS) on a level (II, III) below the respective node (K), characterized in that a plurality of paths (P) within the data structure (DS) leads at least to part of the service objects (D) and/or nodes (K) and to each node (K) and each service object (D) one or more keywords (S) are assigned, and when a spoken entry of the user is received search words are extracted from this spoken entry and, on the basis of the search words, a number of candidate nodes (K) and/or candidate service objects (D) are sought whose assigned keywords (S) match the search words according to a predefined acceptance criterion, a search being made in various search steps until after a search step the number of candidate nodes (K) and/or candidate service objects (D) found is situated above a predefined minimum number and below a predefined maximum number and then by means of the speech output device (3) a speech output menu is produced to announce to the user the categories and/or the services (9, 10) represented by the candidate nodes (K) and/or candidate service objects (D) found for the user to select a certain category or a certain service (9, 10).

2. A method as claimed in claim 1, characterized in that the keywords assigned to a certain node are automatically also assigned to the further nodes and/or service objects classified thereunder.

3. A method as claimed in claim 1 or 2, characterized in that after an unsuccessful search step the search on or including another level (I, II, III) of the data structure (DS) is continued until the number of candidate nodes (K) and/or candidate service objects (D) found is above the predefined minimum number and below the predefined maximum number.

4. A method as claimed in claim 3, characterized in that the search in the data structure (DS) is started on the level (I) of the service objects (D) and then the search is continued step by step on or including a next-higher level (II, III) below the nodes (K).

5. A method as claimed in any one of the claims 1 to 4, characterized in that the predefined minimum number of candidate nodes (K) and/or candidate service objects (D) equals one and when only one candidate service object (D) is determined in a search step, the service (9, 10) represented by this candidate service object (D) is called up.

6. A method as claimed in any one of the claims 1 to 5, characterized in that the predefined minimum number of candidate nodes (K) and/or candidate service objects (D) equals one and when only one candidate node (K) is determined in a search step, the search is aborted and, independently of the respective number, all categories or services (9, 10) are presented to the user in a speech output menu which categories and services are represented by the nodes (K) and/or service objects (D) which are situated in the data structure (DS) below the respective candidate node (K) and are connected therewith via a path (P).

7. A method as claimed in claim 6, characterized in that the categories or services are issued in groups with a group reference.

8. A method as claimed in any one of the claims 1 to 7, characterized in that the acceptance criterion is a minimum number of matches between the extracted search words and the keywords assigned to a node or service object.

9. A method as claimed in any one of the claims 1 to 8, characterized in that within a search step when the number of candidate nodes and/or candidate service objects is too small, the acceptance criterion is broadened.

10. A method as claimed in any one of the claims 1 to 9, characterized in that in so far as the speech dialogue system after a first search and an announcement to the user of the categories and/or services representing the candidate nodes and/or candidate service objects found, receives a new spoken entry from the user which contains new search words that can be extracted by the speech dialogue system, determines in a second search a new number of candidate nodes and/or candidate service objects on the basis of the new search words, and forms the intersection of the candidate nodes and/or candidate service objects found in the first search and of the candidate nodes and/or candidate service objects found in the second search, and preferably announces to the user those categories and/or services that are represented by the candidate nodes and/or candidate service objects found in the intersection.

11. An automatic speech dialogue system (1)
- comprising a speech recognition device (2) and a speech output device (3) for communication with a user
15 - comprising a plurality of services (9) that can be selected by the user in the speech dialogue system (1) and/or means (7) for transferring the user via the speech dialogue system (1) to services (10) that can be selected by the user,
- comprising a dialogue control unit (4) for controlling the dialogue for the selection of a service (9, 10) by the user
20 - and comprising a database (6) having a hierarchical data structure (DS) with a plurality of nodes (K) and a plurality of paths (P) to interconnect the nodes (K) and to connect the nodes (K) to service objects (D) which are arranged at a respective end of a path (P) in the data structure (DS), while the service objects (D) represent the services (9, 10) which are available and the nodes (K) represent the respective categories in which other categories and/or services are classified which are represented by further nodes (K) and/or service objects (D) arranged on a level (II, III) below the respective node (K) in the hierarchical data structure (DS),
25 characterized in that a plurality of different paths (P) lead at least to part of the service objects (D) and/or nodes (K) in the data structure (DS), in that one or more keywords (S) are assigned to each node (K) and each service object (D) of the database (6) and in that the speech dialogue system (1) comprises:
30 - an analysis unit (11) for extracting search words from a spoken entry received from the user,

- a search unit (12) for searching on the basis of the search words a number of candidate nodes (K) and/or candidate service objects (D) within the database (6), whose assigned keywords (S) match the search words according to a predefined acceptance criterion, the search unit (12) having such a structure that it carries out a search in various search steps until after a search step the number of candidate nodes (K) and/or candidate service objects (D) found is situated above a predefined minimum number and below a predefined maximum number,
 - and a prompt generation unit (13) for generating after a successful search step a speech output menu to announce to the user the categories and/or services (9, 10) represented by the candidate nodes (K) and/or candidate service objects (D) found for him to select a certain category or a certain service (9, 10) by means of a speech output device (3).
12. A computer program comprising computer code means for carrying out all the steps of a method as claimed in any one of the claims 1 to 10 when the program is run on a computer of a speech dialogue system.